S

Date Received for Clearance Process (MM/DD/YY) 08/18/05

INFORMATION CLEARANCE FORM

A. Information Category

- ☐ Abstract
- ☐ Journal Article
- ☐ Summary
- ☐ Internet
- ☐ Visual Aid
- ☐ Software
- ☐ Full Paper
- ☒ Report
- ☐ Other _____

B. Document Number WMP-27073 Rev. 0

C. Title
Description of Work for the 2005 Installation of Groundwater Well C4948 at WMA T, 200-ZP-1 Operable Unit

D. Internet Address

E. Required Information

1. Is document potentially Classified? ◉ No ○ Yes (MANDATORY)
(See B1K. H)
Manager Required (Print and Sign)

If Yes _____ ◉ No ○ Yes Classified
ADC Required (Print and Sign)

2. References in the Information are Applied Technology ◉ No ○ Yes
Export Controlled Information ◉ No ○ Yes

3. Does Information Contain the Following: (MANDATORY)
a. New or Novel (Patentable) Subject Matter? ◉ No ○ Yes
If "Yes", Disclosure No.: _____
b. Information Received in Confidence, Such as Proprietary and/or Inventions?
◉ No ○ Yes If "Yes", Affix Appropriate Legends/Notices.
c. Copyrights? ◉ No ○ Yes If "Yes", Attach Permission.
d. Trademarks? ◉ No ○ Yes If "Yes", Identify in Document.

4. Is Information requiring submission to OSTI? ◉ No ○ Yes

5. Release Level? ◉ Public ○ Limited

F. Complete for a Journal Article

1. Title of Journal

G. Complete for a Presentation

1. Title for Conference or Meeting _____
2. Group Sponsoring _____
3. Date of Conference _____ 4. City/State _____
5. Will Information be Published in Proceedings? ○ No ○ Yes 6. Will Material be Handed Out? ○ No ○ Yes

H. Author/Requestor
B. Helgeson F D Walker
(Print and Sign)

Responsible Manager
Ron Jackson for J. V. Borghese
(Print and Sign)

Approval by Direct Report to FH President (Speech/Articles Only) _____
(Print and Sign)

I. Reviewers

	Yes	Print	Signature	Public Y/N (If N, complete J)
General Counsel	☒	S.B. Cherry	S B Cherry	(Y) / N
Office of External Affairs	☐			Y / N
DOE-RL	☐			Y / N
Other	☒	J. P. Aardal	Jamie Aardal	(Y) / N
Other	☐			Y / N

J. If Information Includes Sensitive Information and is not to be released to the Public indicate category below.

- ☐ Applied Technology
- ☐ Personal/Private
- ☐ Proprietary
- ☐ Business-Sensitive
- ☐ Predecisional
- ☐ UCNI
- ☐ Protected CRADA
- ☐ Export Controlled
- ☐ Procurement-Sensitive
- ☐ Patentable
- ☐ Other (Specify) _____

Information Clearance Approval
APPROVED FOR RELEASE OFFICIAL DOCUMENT Date 8/19/2005

K. If Additional Comments, Please Attach Separate Sheet

ADMINISTRATIVE DOCUMENT PROCESSING AND APPROVAL

Sheet 1 of 1

DOCUMENT TITLE:	OWNING ORGANIZATION/FACILITY:
Description of Work for the 2005 Installation of Groundwater Well C4948 at WMA T, 200-ZP-1 Operable Unit	FH
Document Number: WMP-27073	**Revision/Change Number:** 0

DOCUMENT TYPE *(Check Applicable)*

☐ Plan ☒ Report ☐ Study ☐ Description Document ☐ Other

DOCUMENT ACTION ☒ New ☐ Revision ☐ Cancellation

RESPONSIBLE CONTACTS

	Name	Phone Number
Author:	Bjorn Helgeson	
Manager:	J. V. Borghese	373-3804

DOCUMENT CONTROL

Does document contain scientific or technical information intended for public use? ☐ Yes ☒ No

Does document contain controlled-use information? ☐ Yes ☒ No

("Yes" requires information clearance review in accordance with HNF-PRO-184)

DOCUMENT REVISION SUMMARY

NOTE: Provide a brief description or summary of the changes for the document listed.

REVIEWERS

Others

Name *(print)*	Organization
J. V. Borghese	Manager, Remedial Actions
J. D. Isaacs	Manager, Engineering
J. A. Winterhalder	Environmental Compliance
C. S. Wright	Task Lead

APPROVAL SIGNATURES

Author:	8-10-05	RELEASE / ISSUE
Name: (Print) B. Helgeson for B. Helgeson	Date	
Responsible Manager:		AUG 19 2005
Name: (Print) J. V. Borghese Ron Jackson for 8-18-05	Date	DATE: STA: 15 HANFORD RELEASE ID: 20
Other:		
Name: (Print)	Date	

WMP-27073
Revision 0

S

Description of Work for the 2005 Installation of Groundwater Well C4948 at WMA T, 200-ZP-1 Operable Unit

Prepared for the U.S. Department of Energy
Assistant Secretary for Environmental Management

Project Hanford Management Contractor for the
U.S. Department of Energy under Contract DE-AC06-96RL13200

Fluor Hanford
P.O. Box 1000
Richland, Washington

S

WMP-27073
Revision 0

Description of Work for the 2005 Installation of Groundwater Well C4948 at WMA T, 200-ZP-1 Operable Unit

Document Type: TR Program/Project: WMP

B. Helgeson
Freestone Environmental Services, Inc.

Date Published
August 2005

Prepared for the U.S. Department of Energy
Assistant Secretary for Environmental Management

Project Hanford Management Contractor for the
U.S. Department of Energy under Contract DE-AC06-96RL13200

Fluor Hanford
P.O. Box 1000
Richland, Washington

L. D. Arnold 8/19/2005
Release Approval Date

Approved for Public Release;
Further Dissemination Unlimited

APPROVAL PAGE

Title: Description of Work for the 2005 Installation of Groundwater Well C4948 at WMA T, 200-ZP-1 Operable Unit

Approvals:

J. V. Borghese
Manager, Remedial Actions, Groundwater Remediation Project

Ron Jackson for
Signature

8/16/05
Date

J. D. Isaacs
Manager, Engineering, Groundwater Remediation Project

Signature

8-16-05
Date

J. A. Winterhalder
Environmental Compliance Officer, Groundwater Remediation Project

Signature

8/15/05
Date

C. S. Wright
Task Lead, Groundwater Remediation Project

Signature

8/15/05
Date

This page intentionally left blank.

TABLE OF CONTENTS

FIGURES

TABLES

ACRONYMS

bgs	below ground surface
CFR	*Code of Federal Regulations*
COC	contaminant of concern
DOW	Description of Work
DQO	Data Quality Objective
ERDF	Environmental Restoration Disposal Facility
FH	Fluor Hanford, Inc.
QA	quality assurance
RCRA	*Resource Conservation and Recovery Act of 1976*
SST	single-shell tank
WAC	*Washington Administrative Code*
WMA	Waste Management Area

METRIC CONVERSION CHART

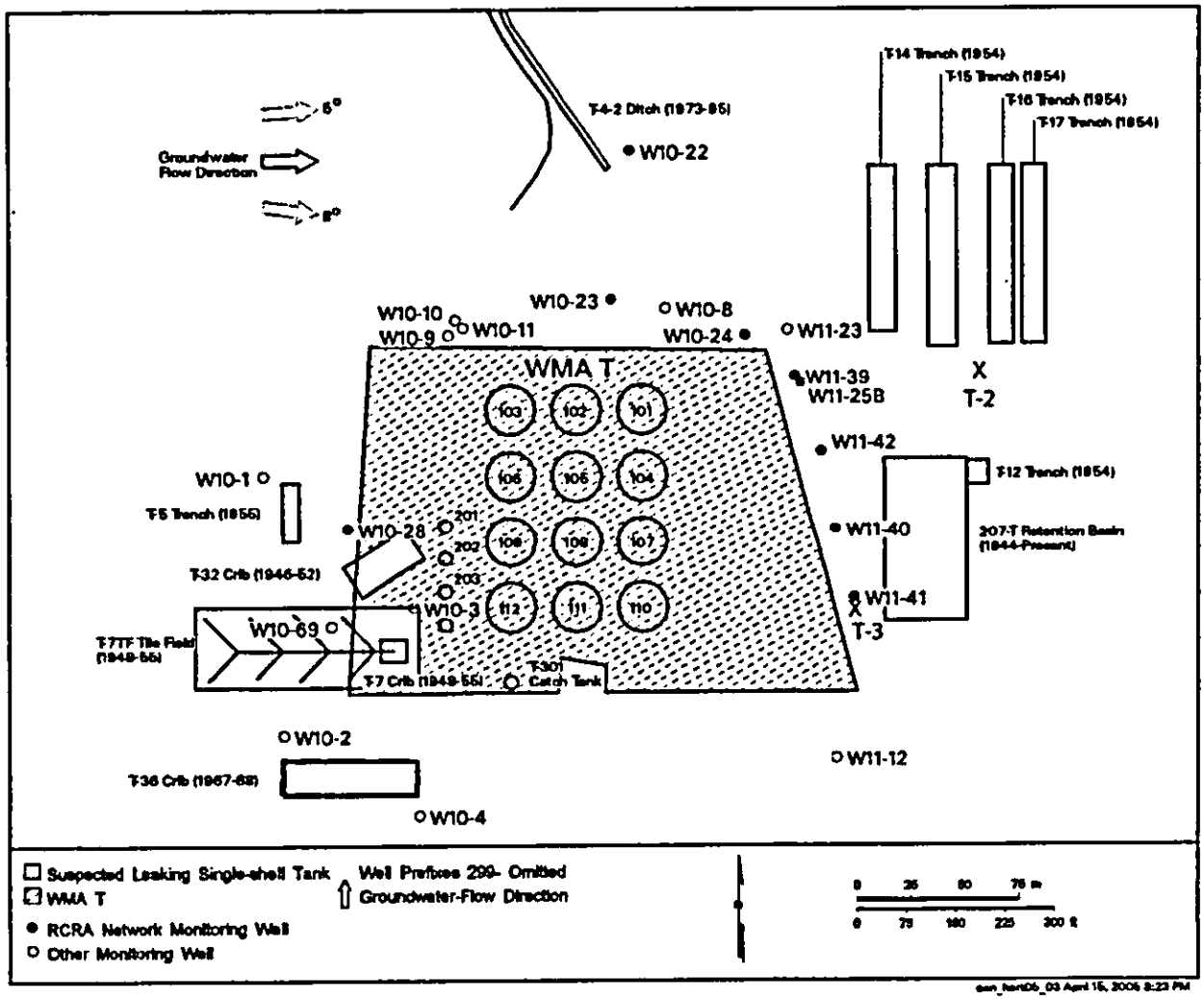
Into Metric Units			Out of Metric Units		
If You Know	*Multiply By*	*To Get*	*If You Know*	*Multiply By*	*To Get*
Length			**Length**		
Inches	25.4	millimeters	millimeters	0.039	inches
Inches	2.54	centimeters	centimeters	0.394	inches
Feet	0.305	meters	meters	3.281	feet
Yards	0.914	meters	meters	1.094	yards
Miles	1.609	kilometers	kilometers	0.621	miles
Area			**Area**		
sq. inches	6.452	sq. centimeters	sq. centimeters	0.155	sq. inches
sq. feet	0.093	sq. meters	sq. meters	10.76	sq. feet
sq. yards	0.0836	sq. meters	sq. meters	1.196	sq. yards
sq. miles	2.6	sq. kilometers	sq. kilometers	0.4	sq. miles
Acres	0.405	hectares	hectares	2.47	acres
Mass (weight)			**Mass (weight)**		
Ounces	28.35	grams	grams	0.035	ounces
Pounds	0.454	kilograms	kilograms	2.205	pounds
Ton	0.907	metric ton	metric ton	1.102	ton
Volume			**Volume**		
Teaspoons	5	milliliters	milliliters	0.033	fluid ounces
Tablespoons	15	milliliters	liters	2.1	pints
fluid ounces	30	milliliters	liters	1.057	quarts
Cups	0.24	liters	liters	0.264	gallons
Pints	0.47	liters	cubic meters	35.315	cubic feet
Quarts	0.95	liters	cubic meters	1.308	cubic yards
Gallons	3.8	liters			
cubic feet	0.028	cubic meters			
cubic yards	0.765	cubic meters			
Temperature			**Temperature**		
Fahrenheit	subtract 32, then multiply by 5/9	Celsius	Celsius	multiply by 9/5, then add 32	Fahrenheit
Radioactivity			**Radioactivity**		
Picocuries	37	millibecquerel	millibecquerel	0.027	picocuries

1.0 SCOPE OF WORK

This description of work (DOW) describes the well drilling and well construction of a deep groundwater monitoring well during calendar year 2005. The new well will be drilled downgradient of Waste Management Area (WMA) T in 200 West Area. The well location is shown as "T-2" in Figure 1. Well 299-W11-45 (C4948) is located approximately 262 ft east of existing well 299-W11-25B. The justification for installation of well 299-W11-45 (C4948) can be found in the *Data Quality Objectives Summary Report for Establishing a RCRA/CERCLA/AEA Integrated 200 West and 200 East Area Groundwater Monitoring Network* (CP-15329).

Figure 1. Location Map for Well 299-W11-45 (C4948).

Site T-2 is the well location.



Well 299-W11-45 (C4948) will be drilled such that it can be constructed either as an extraction well for a pump-and-treat system or as monitoring well for the WMA T groundwater assessment.

Because of this, the diameter of the borehole at total depth must be sufficient to allow completion of a 6-in. diameter permanent screen and casing, and if technetium-99 is present at depth, a 6 in. completion below the lower mud unit. A drilling contractor will perform all drilling and well construction. Testing of samples collected from the borehole in the treatability test area will be performed by Pacific Northwest National Laboratory.

2.0 BACKGROUND

This section discusses previous work activities and regulatory decisions associated with the *Resource Conservation and Recovery Act of 1976* (RCRA)/*Comprehensive Environmental Response, Compensation and Liability Act of 1980* Program in the 200 West Area. General summaries of hydrogeology, contaminants of interest, and conceptual models of relevant factors associated with the planned work activities are presented.

The single-shell tanks (SST) at the Hanford Site contain radioactive and hazardous chemical waste generated from plutonium production and separation activities. The 149 SSTs are hazardous waste management units regulated under RCRA and Washington State's "Hazardous Waste Management" (*Revised Code of Washington* 70.105) and its implementing requirements (*Washington Administrative Code* [WAC] 173-303, "Dangerous Waste Regulations").

2.1 REMEDIAL ACTION GOALS AND PREVIOUS WORK ACTIVITIES

WMA T is located in the central part of the 200 West Area. T-Plant waste was sent to the T tank farm from 1948 to 1956. These SSTs were used for settling solids from chemical processing of reactor fuel for plutonium production. Groundwater monitoring at the WMA T is regulated under RCRA interim-status regulations (40 *Code of Federal Regulations* (CFR) 265, Subpart F, by reference of WAC 173-303-400[3]). Assessment groundwater monitoring was initiated because of elevated specific conductance values detected in down-gradient wells (BHI-01518, *Description of Work for Calendar Year 2001 RCRA Drilling*).

In 2000, four wells were installed outside the T tank farm (PNNL-13590, *Borehole Data Package for Calendar Year 2000-2001 RCRA Wells at Single-Shell Tank Waste Management Area T).* In 2001, one well was installed outside the T tank farm (PNNL-13830, *Borehole Data Package for Calendar Year 2000-2001 RCRA Wells at Single-Shell Tank Waste Management Area T*). In 2005, well 299-W11-25B (C4669) was drilled and later decommissioned due to complications encountered during well completion. Also in 2005, well 299-W11-46 (C4950) was drilled and completed as a replacement well for 299-W11-25B (C4669). The replacement well is located approximately 10 ft from the decommissioned well.

2.2 . SITE GEOLOGY/HYDROGEOLOGY

The major stratigraphic units underlying the 200 Areas (Hanford formation, Cold Creek unit, Ringold Formation, and Columbia River Basalt Group) include recent deposits. The regional geologic setting of the Pasco Basin and the Hanford Site has been described in numerous publications (e. g., PNNL-12261, *Revised Hydrogeology for the Suprabasalt Upper Aquifer System*; PNNL-13858, *Revised Hydrogeology for the Suprabasalt Aquifer System*) and will not be detailed here. A summary of the geology is presented in the sections below. The depths and

thicknesses of the formations are based on information from nearby wells and may not reflect exact depths at the planned locations.

Based on information from near by wells (Figure 2), Well 299-W11-45 (C4948) will encounter Hanford formation gravel dominated facies to a depth of 34 ft below ground surface (bgs) and Hanford formation sand dominated facies with gravelly sand or silt/clay interbeds from 34 to 90 ft bgs. The Cold Creek unit, consisting of carbonate-rich silt and sand interfingered with carbonate-poor silt and sand and occasional calcrete, occurs between 90 and 130 ft bgs. A thin zone of carbonate-rich silty sandy gravel consistent with the Upper Ringold will be encountered between 130 and 145 ft bgs. Moderate to well cemented sandy gravel/silty sandy gravel of the Ringold Formation Unit E will constitute the geology from 145 to 409 ft bgs. The Ringold lower mud unit consisting of lacustrine fine-grained facies was encountered at 409 ft bgs in well 299-W11-25B. The thickness of this unit is estimated to be approximately 20 ft near T tank farm (PNNL-13858). The Ringold Unit 9 consisting of coarse basaltic gravels are estimated to occur from approximately 429 to 500 ft bgs. The top of the Saddle Mountains Basalt is estimated at 500 ft bgs. Static water level is expected at 240 ft bgs.

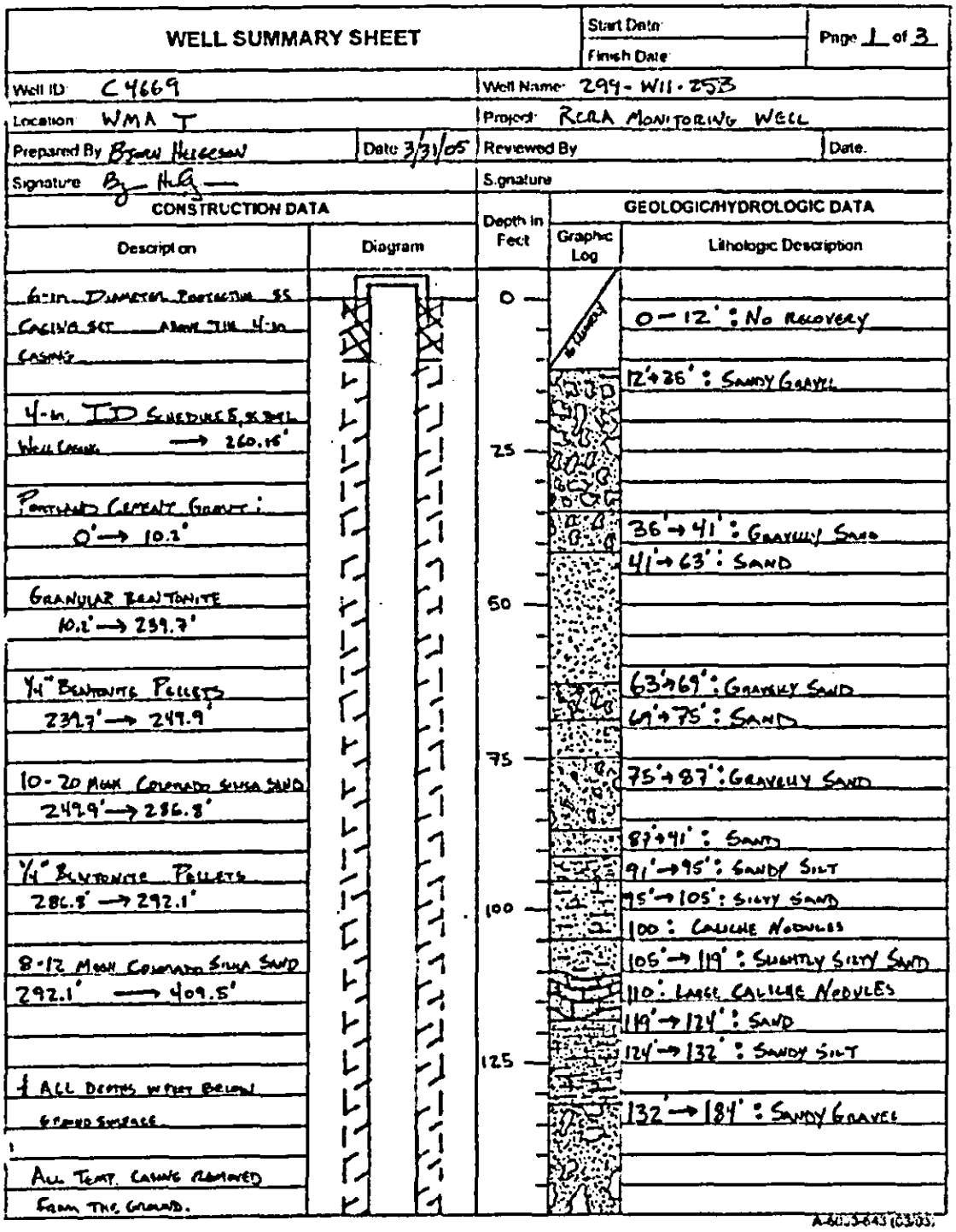
2.3 CONTAMINANTS OF CONCERN

This section presents contaminants of concern (COCs) associated with the T tank farm area. Table 1 identifies the list of COCs based on process knowledge associated with SST systems and results of recent sampling of nearby wells. COCs for waste sampling will be addressed in the waste data quality objective (DQO) documents.

Table 1. Contaminants of Concern Based on Process Knowledge for T Tank Farm.

Radiological Constituents
americium-241, carbon-14, cesium-137, cobalt-60, europium-152, europium-154, europium-155, tritium (H-3), neptunium-237, nickel-63, plutonium-238, plutonium-239/240, strontium-90, technetium-99, thorium-232, uranium-234, uranium-235, uranium-238, iodine-129
Nonradiological Constituents – Metals
antimony, beryllium, bismuth, cadmium, chromium, chromium (hexavalent), copper, lead, mercury, nickel, silver, tin, manganese, calcium, sodium, magnesium.
Nonradiological Constituents – General Inorganics
ammonia/ammonium, cyanide, nitrates/nitrites, fluoride, sulfate, chloride
Volatile and Semi-Volatile Organics
1,2-dichloroethane, 1,1-dichloroethane, 2,4-dinitrotoluene, butanol (n-butyl alcohol), benzyl alcohol, chlorobenzene, ethylbenzene, hexachlorobenzene, hexachlorobutadiene, hexachloroethane, normal paraffin hydrocarbons, pentachlorophenol, phenol, tetrachloroethylene, tetrahydrofuran, toluene, tributylphosphate, trichloroethylene, trichloromethane (chloroform), vinyl chloride, xylene (total), cis/trans-1,2-trichloroethylene, carbon tetrachloride, methylene chloride

Figure 2. Well Summary Sheet for Decommissioned Well 299-W11-25B. (3 sheets)



WELL SUMMARY SHEET

Start Date:
Finish Date:
Page 1 of 3

Well ID: C4669
Well Name: 299-W11-253
Location: WMA T
Project: RCRA MONITORING WELL
Prepared By: Brian Heffernan
Date: 3/31/05
Reviewed By:
Date:
Signature: Br Hef
Signature:

CONSTRUCTION DATA

Description:

6-in. DIAMETER PORTLAND SS CASING SET ABOVE THE 4-in CASING

4-in. ID SCHEDULE 5 SS WELL CASING → 260.15'

PORTLAND CEMENT GROUT: 0' → 10.2'

GRANULAR BENTONITE 10.2' → 239.7'

¼" BENTONITE PELLETS 239.7' → 249.9'

10-20 MESH COLORADO SILICA SAND 249.9' → 286.8'

¼" BENTONITE PELLETS 286.8' → 292.1'

8-12 MESH COLORADO SILICA SAND 292.1' → 409.5'

† ALL DEPTHS WERE BELOW GROUND SURFACE

ALL TEMP. CASING REMOVED FROM THE GROUND.

Diagram

Depth in Feet: 0, 25, 50, 75, 100, 125

GEOLOGIC/HYDROLOGIC DATA

Graphic Log

Lithologic Description:

0 → 12': NO RECOVERY
12' → 36': SANDY GRAVEL
36' → 41': GRAVELLY SAND
41' → 63': SAND
63' → 69': GRAVELLY SAND
69' → 75': SAND
75' → 87': GRAVELLY SAND
87' → 91': SAND
91' → 95': SANDY SILT
95' → 105': SILTY SAND
100: CALICHE NODULES
105' → 119': SLIGHTLY SILTY SAND
110: LARGE CALICHE NODULES
119' → 124': SAND
124' → 132': SANDY SILT
132' → 184': SANDY GRAVEL

A-6003-643 (03/03)

Figure 2. Well Summary Sheet for Well 299-W11-25B. (3 sheets)

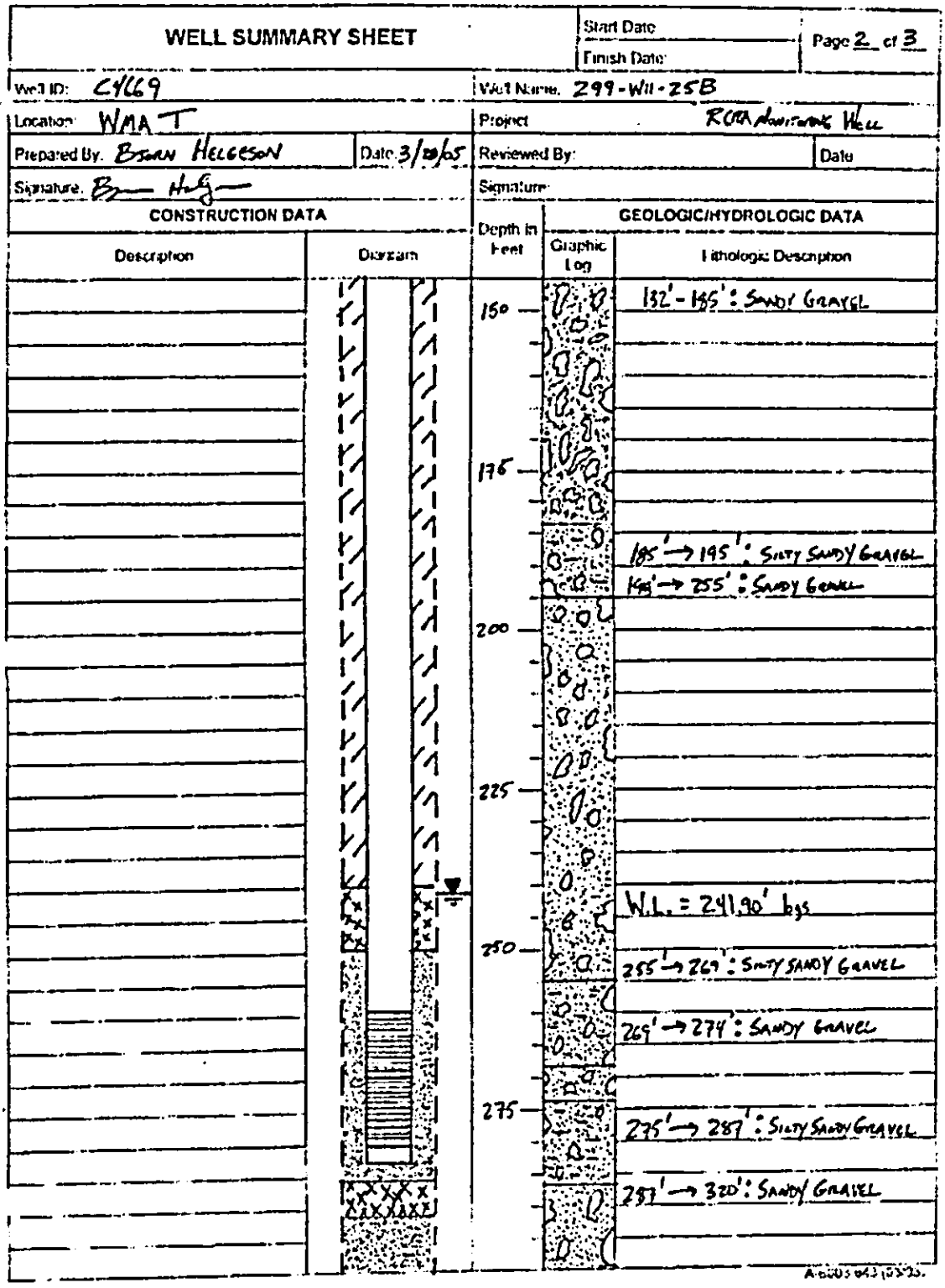


Figure 2. Well Summary Sheet for Well 299-W11-25B. (3 sheets)

WELL SUMMARY SHEET

Start Date:
Finish Date:
Page 3 of 3

Well ID: C4669
Well Name:
Location: WMAT
Project:
Prepared By: BJOHN HELGESON
Date: 3/28/05
Reviewed By:
Date:
Signature: BJ HG
Signature:

CONSTRUCTION DATA

Description	Diagram
WELL SCREEN 4-IN ID, 0.020-in. SLOT CONT. WIRE-WRAP, SS TYPE 304 260.2' → 280.2'	
SUMP 4-IN ID SS 304 L 280.2 → 292.2	
TEMPORARY CASING 9" X 6" DUAL WALL CARBON STEEL 0' → 409.5	

GEOLOGIC/HYDROLOGIC DATA

Depth in Feet	Graphic Log	Lithologic Description
300		287' → 320': SANDY GRAVEL
		320' → 323': SAND
325		323' → 406': SANDY GRAVEL
350		
375		
		406' → 409': SILTY SAND
400		409' → 409.5': SILT (LOWER RUPELO MUD)
		T.D. = 409.5'

A 6053-643 (03/03)

This page intentionally left blank.

3.0 DESCRIPTION OF WORK ACTIVITIES

The planning and construction of the well will be conducted under this DOW and will adhere to the guidelines and requirements presented in Fluor Hanford, Inc. (FH) procedure GRP-EE-02-14.1, "Drilling, Remediating, and Decommissioning Resource Protection Wells, and Geotechnical Soil Borings." A completed drilling planning form will be submitted to the FH Groundwater Protection Program contact prior to initiation of field activities. Well 299-W11-45 (C4948) will conform to resource protection well standards as defined in WAC 173-160, "Minimum Standards for Construction and Maintenance of Wells."

3.1 WELL SITE PREPARATION

Drill pad and limited access roads will be constructed as needed for the well. Ground penetrating radar surveys, will be conducted as necessary by FH as part of site preparation prior to drilling.

3.2 DRILLING

The drilling contractor will be responsible for complying with well drilling and construction standard defined in the WAC 173-160. The drill rig and all down-hole equipment will be pressure washed prior to use and between wells to minimize potential cross-contamination. The final total depth of the well will be determined by the field geologist and may change depending on the hydrogeologic conditions encountered. Well 299-W11-45 (C4948) will be drilled to the top of the Ringold Formation lower mud unit (approximately 409 ft bgs) in such a way that they can be deepened to the top of basalt (approximately 500 ft bgs) if contamination is present at the top of the lower mud unit. The water table is expected at approximately 239 to 243 ft bgs. Estimated total drill depths are included in Table 2.

Well 299-W11-45 (C4948) will be drilled such that it can be constructed either as an extraction well for a pump-and-treat system or as monitoring well for the WMA T groundwater assessment. Because of this, the diameter of the borehole at total depth must be sufficient to allow completion of a 6-in. diameter well above Ringold lower mud or 4-in. diameter well at total depth (below Ringold lower mud) permanent screen and casing.

Previous drilling activities for recent RCRA wells near T Plant were evaluated as low radiological risk. Radiological contamination in the vadose zone is not a concern at these sites, however, radiological contamination (technetium-99 and cobalt-60) was encountered below the static water level in well 299-W11-25B (C4669). Based on the current risk evaluation, the level of radiological protection support is scheduled for daily a.m./p.m. checks.

Drilling activities at the well site will be documented by the assigned field geologist(s) on field activity report sheets.

Table 2. Proposed Well Construction.

Well Name	Estimated Depth to Water (ft)[1]	Estimated Drill Depth (ft)[2]	Screen and Casing Diameter (in.)	Screen Slot Size	Screen Length/ Interval (ft)	Filter Pack Mesh/ Interval (ft)	Bentonite Interval (ft)	Cement Seal Interval (ft)
Monitoring Well Design								
C4948	240	409/505	6	20	10 or 35 TBD[3]	10-20 TBD[3]	TBD	0 – 10
Extraction Well Design								
C4948	240	409/505	6	20	Up to 50' TBD[3]	10-20 TBD[3]	TBD	0 – 10

Notes:
[1] Estimated depth to water taken from data from previously drilled wells in Waste Management Area T.
[2] Well 299-W11-45 (C4948) will be drilled to the top of the Ringold Formation lower mud unit (approximately 409 ft below ground surface) in such a way that they can be deepened to the top of basalt (approximately 505 ft below ground surface) if contamination is present at the top of the lower mud unit.
[3] Screened interval and interval of filter pack and bentonite seal will be identified after evaluation of sample data.
TBD = to be determined.

3.3 CHARACTERIZATION ACTIVITIES

Groundwater and sediment characterization requirements during the drilling and construction of well 299-W11-45 (C4948) are described in Section 4.0 of the *Sample and Analysis Plan for Calendar Year 2005 RCRA Well Drilling at Single Shell Tanks, Waste Management Area T* (DOE/RL-2005-72). The required characterization activities are also summarized in Table 3 and in the subsections below.

Table 3. Characterization Requirements for Well 299-W11-45 (C4948).

Well ID	Estimated Depth to Groundwater (ft bgs)	Lithologic Grab Samples Retained	Water Sampling	Aquifer Testing	Geophysical Logging	Deviation Survey
C4948	240 ft +/- 5 ft	Archive samples at 5-ft intervals and chip tray samples	Grab groundwater slurry sample at water table and at 5-ft intervals to total TD. Pumped water samples will be collected at 10-ft intervals below the water table between 10 and 60 ft (inclusive) depth and at 20-ft intervals below 60-ft depth. The last planned pumped sample will be from just above the Ringold lower mud unit. If samples are collected below the Ringold lower mud, this will be documented separately.	Slug tests at 5, 15, 30, and 45 ft below the water table and just above the Ringold lower mud unit. The final slug test will occur near the bottom of borehole.	RLS geophysical logging performed 0 - TD	Borehole Gyroscope

Notes:
bgs = below ground surface.
RLS = radiologic logging system.
TD = total depth.
WMA = Waste Management Area.

3.3.1 Sediment Characterization

Representative sediment samples will be collected at 5-ft intervals throughout the entire borehole. Additional samples are to be collected at significant changes in lithology or at depths where unusual conditions or sediments are encountered. Samples are to be collected in pint glass jars supplied by FH. If representative samples cannot be collected (for example, if large particles do not fit in the container), notes describing the condition of the sample will be put in the geologist's log. The samples are to be archived in the Pacific Northwest National Laboratory Geotechnical Sample Library after collection. All sediment samples are to be labeled with the borehole number, sample depth, and date of sample and documented on the geologist log. The field geologist will observe the cuttings generated during drilling and shall prepare a borehole log in accordance with FH procedure GRP-EE-01-7.0, "Geologic Logging.".

In addition to the archived samples, small volume samples for chip trays are to be collected. These samples are to be made available to the project scientist to corroborate the field geologist descriptions and aid in the hydrogeologic interpretation for use in constructing maps and cross-sections for conceptual models.

Spectral gamma instruments will be used for geophysical logging all intervals in borehole. Logging can only be conducted through one string of casing of 10-in. or smaller inner diameter, therefore logging will be conducted prior to sizing down casing.

3.3.2 Groundwater Characterization

Ten groundwater samples will be collected by pumping after purging the well. Pumped samples will be collected at 10, 20, 30, 40, 50, 60, 80, 100, 120, and 140 ft depths below the water table (Table 3). The samples are to be representative, to the extent practicable, of the aquifer at the depth of the samples; therefore, the following collection method will be used. These additional water samples shall be collected using a submersible pump unless otherwise specified by FH.

Water-level measurements are required at several times during well drilling, construction, and development. Water-level measurements should be recorded to the nearest 0.0033 m (0.01 ft). The purpose of the measurements is to aid understanding of the hydraulic properties of the aquifer through which the borehole is drilled. These properties are used to:

1. Decide well construction details such as screen slot size, screen length and depth.
2. Interpret aquifer flow direction.
3. Interpret subsurface contaminant movement.

The depth to water, from a known and constant datum, should be measured:

1. As soon as possible after encountering the water table.
2. In the morning prior to starting the day's drilling.
3. During well development to monitor drawdown.
4. After well development to monitor recovery.

Aquifer testing will be performed in well 299-W11-45 (C4948), and consist of pneumatic slug testing, and/or rod withdrawal slug testing (Table 3). The slug tests will be performed at depths of 5, 15, 30, and 45 ft below the water table and just above the Ringold Formation lower mud unit. The last slug test will be conducted near the bottom of the borehole.

A more detailed suite of tests may be conducted in each well after well construction (DOE/RL-2005-72). The test suite may include slug tests, tracer-dilutions tests, tracer pump-back tests, constant-rate pumping tests, and vertical flow, in-well tracer tests.

3.4 WELL DEVIATION SURVEYS

A downhole deviation survey using a borehole gyroscope will be performed following construction and prior to sampling pump installation. The purpose of the deviation survey is to measure how plumb or vertical the well is and to determine the vertical and horizontal location coordinates of the total depth relative to the borehole surface location. The amount of deviation is used to correct the depth-to-water measurements and to determine water-level elevations. The survey will be scheduled by FH and conducted by Duratek Technical Services according to FH requirements.

3.5 WELL CONSTRUCTION

The well will be constructed to meet the minimum standards required by WAC 173-160.

Well 299-W11-45 (C4948) will be drilled such that it can be constructed either as an extraction well for a pump-and-treat system or as monitoring well for the WMA T groundwater assessment. The proposed well design for a groundwater monitoring or extraction well are shown in Figure 3. The well will be constructed with type 304-316L stainless steel 0.020-in (20 slot) V-slot continuous wire wrap screen atop a 2- or 3-ft-long stainless steel sump with end cap, and casing of the same material extending to the surface. Both well designs will be constructed using nominal 6-in. diameter well above Ringold lower mud or 4-in. diameter well at total depth (below Ringold lower mud) final screen and casing. An environmentally compatible non-petroleum lubricant such as Jet-Lube Well Guard thread compound or equivalent may be used for lubricating the threads of the stainless steel while installing the casing. The screened interval will range in length between 10 and 50 ft and will be determined based on sampling data and geologic conditions. The criteria for screen length selection using sample results are outlined in DOE/RL-2005-72. A 2- or 3-ft long tailpipe (sump) will be placed below the screen. If drilling is required below the Ringold Formation lower mud unit, then the well design may change and will be determined after the geochemical data have been obtained and evaluated.

Final placement of the well screen will be at the direction of the Buyer's Technical Representative and/or FH's field geologist/hydrogeologist. Prior to placement of the screen and casing the extended borehole will be backfilled using 8-12, 10-20 mesh or other available silica sand up to 10 ft below the bottom of the proposed screen interval. Five feet of bentonite pellets will be placed to 5 ft below the bottom of the proposed screen interval. Primary filter pack will be placed from the top of the bentonite seal, or the bottom of the borehole if there is no seal, to a minimum of 10 ft above either the top of screen or the water table, whichever is higher. Mesh

size of filter pack will be verified by sieve analysis, but is expected to be 10-20 mesh based on data from adjacent wells. Bentonite pellets will be placed immediately on top of the primary filter pack for a minimum thickness of 5 ft. Granular bentonite or crumbles will be placed from the top of the bentonite pellets to approximately 10 ft bgs. A cement grout seal will be placed immediately on top of the bentonite granules to ground surface. If excessive cement losses occur, then accelerators may be used. The surface construction consisting of protective casing, protective guard posts, and cement pad must be set prior to final well development.

Surface protection for well 299-W11-45 (C4948) will be installed in accordance with WAC 173-160-420 and GPR-EE-02-14.1 with the following modifications:

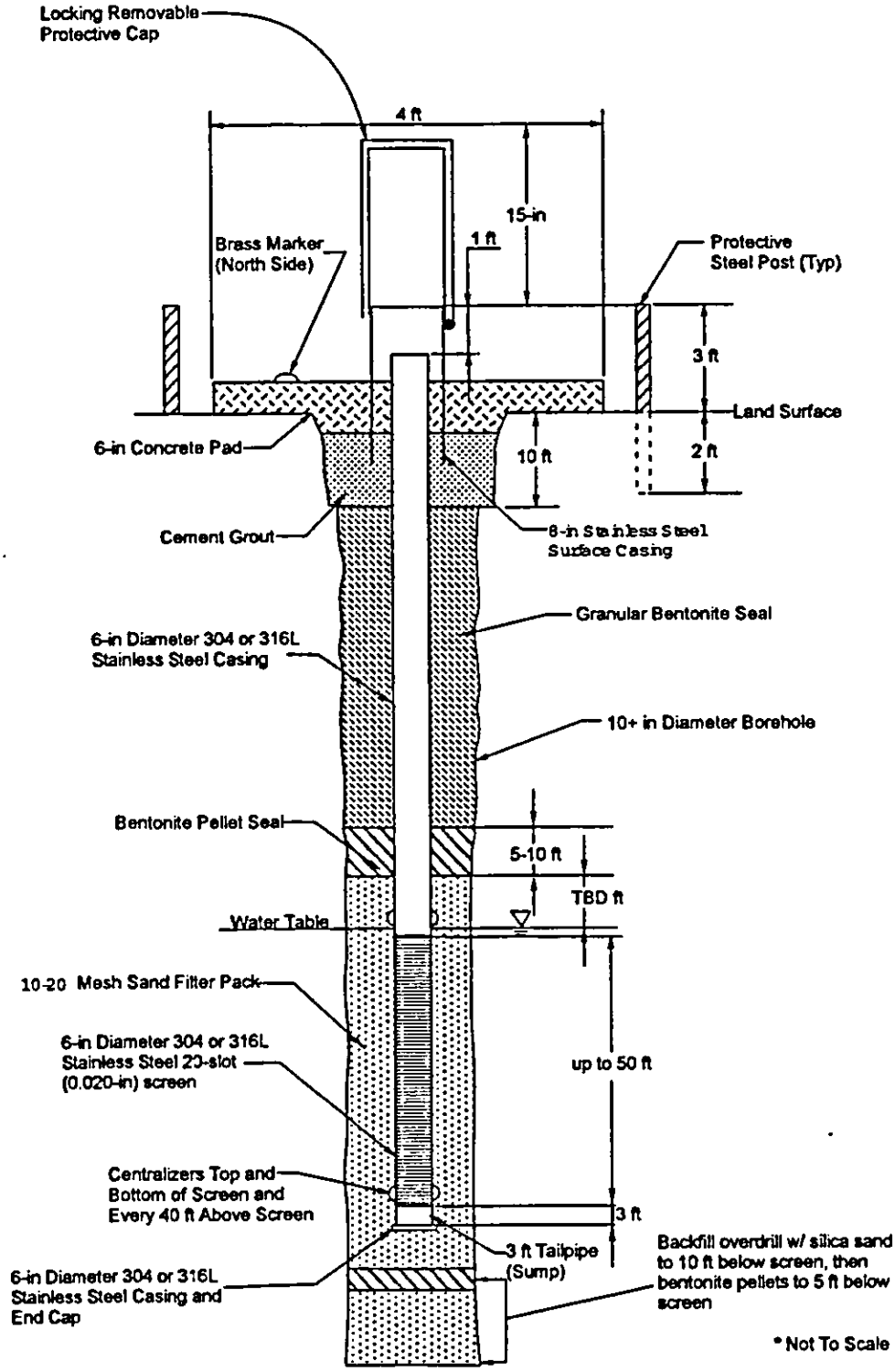
- Concrete pad will be 4 ft by 4 ft square by 6-in.-thick steel, reinforced with 6-in. by 6-in., W1.4 by W1.4 welded-wire fabric (as a minimum).
- A steel protective casing with locking cover will be placed over the well casing and set into the pad.
- A brass survey marker with the well name and an inscribed identification number will be installed on the north side of the pad.
- A Washington State Department of Ecology well number tag shall be attached to the outside of the protective casing.
- Four protective steel posts shall be set in concrete at the edge of the concrete pad. One of the posts will be removable to allow sufficient access for operational and maintenance activities.

Surface protection posts and protective casing shall be primed and painted yellow (ANSI 1967, *Safety Color Codes*) and shall meet the requirements of WAC 173-160-420(12) (a).

3.6 DEVELOPMENT OF MONITORING WELL

The objectives of development for the planned monitoring well are to settle the filter pack, prevent uncontrolled infiltration of fines, and ensure hydraulic communication of the well with the surrounding formation. Well development will be conducted in two stages with initial development performed during well construction and final development performed after the wells are completed. Well development activities are directed toward ensuring adequate aquifer communication without causing excessive agitation of the aquifer to avoid potential aeration of the formation. To this end, the drilling subcontractor must provide a variety of well development tools and capabilities.

Figure 3. Well Design for Well 299-W11-45 (C4948).



Initial development will be performed during well construction in conjunction with placement of the filter pack with the use of a dual surge block to both settle the filter pack and to develop communication across the borehole wall. Combining surging with the sand pack placement provides an abrasive action on the borehole wall that enhances borehole efficiency. This initial development is performed as follows:

- Following placement of the screen and final casing, add appropriate amount of filter pack sand, and withdraw the temporary casing a maximum of 10 ft.
- Filter pack sand is added to fill the annular space.
- The surge block is operated gently using short strokes until the sand level settles no more than 0.1 ft in 15 minutes.
- Surging continues until the field geologist confirms completion of the initial development.
- Fines may be removed from the well as necessary.

Final development is performed after well completion and within two weeks of installation of the well screen/casing for well 299-W11-45 (C4948). Fines are removed from the well by bailing and/or pumping in preparation for final development. Final development consists of gently surging the well and bailing to remove residual fines. The well will be surged gently and bailed to remove fines until minimal fines are recovered. During pumping, water samples will be collected for analysis of turbidity, temperature, pH, and specific conductance using field instruments. Development will continue until the well produces clear water (<5 nephelometric turbidity units) and the temperature, pH, and conductivity have stabilized (at least three consecutive measurements within 10% of each other). The project hydrologist or site geologist will determine when development is complete per criteria in FH procedure GPR-EE-01-6.3, "Well Development and Testing." The site geologist will monitor aquifer response and record recovery time.

This page intentionally left blank.

4.0 WASTE MANAGEMENT

The following are the major assumptions for handling and management of wastes derived during the drilling and construction of well 299-W11-45 (C4948). These wastes may include drill cuttings, purgewater, decontamination waste, personal protective equipment, and miscellaneous waste. Specific waste storage, handling, and transport requirements will be documented in the site specific waste packaging and handling package. The FH subcontract technical representatives or waste transportation specialists will provide final waste management instructions for the project.

- Drill cuttings (i.e., soils) from above the water table will be collected on plastic in stockpiles near the point of generation. If site monitoring indicates potential contamination, the soils will be containerized in a drum. Soils that meet the "release criteria" listed below may be placed on the ground near the point of generation. Soils that do not meet release criteria will be disposed at the Environmental Restoration Disposal Facility (ERDF) if waste acceptance criteria can be met or can be treated to meet the criteria.

- Soil must meet the following "release criteria" prior to being placed on the ground near the point of generation:

  - Soils do not designate as a dangerous waste.

  - Contaminant concentrations are below the *Model Toxics Control Act* (WAC 173-340) Method B soil cleanup standards.

  - Soils have been released from a radiological perspective.

- All drill cuttings and purgewater from below the water table will be contained in a drum. Contained soil slurries will be decanted and free liquids remaining in the container will be eliminated by evaporation and/or by the addition of sorbent material before disposal, as necessary. Decanted water will be managed as purgewater. Soils and slurries that meet the release criteria above may be placed on the ground near the point of generation. Decanting slurries and eliminating free liquids are authorized without prior approval. Soils and slurries that do not meet the release criteria will be disposed at ERDF, if ERDF waste acceptance criteria are met or if waste can be treated to meet the waste acceptance criteria.

- Purgewater will be generated during well installation, development, testing, monitoring, sampling, maintenance, and decanting of saturated soils during drilling activities. Purgewater that exceeds collection criteria (Izatt 1990, *Strategy for Handling and Disposing of Purgewater at the Hanford Site, Washington*) will be collected and contained at the well head if necessary, until transported to the Purgewater Storage and Treatment Facility or the Effluent Treatment Facility.

- Miscellaneous solid waste generated from contact with vadose zone or saturated zone soils will require special handling and management requirements only if soils do not meet release criteria. If release criteria are not met then miscellaneous waste will be dispositioned in the same manner as the soils. To minimize the volume of specially-managed waste, miscellaneous solid waste from the saturated zone will be segregated from miscellaneous solid waste from the vadose zone.

5.0 QUALITY ASSURANCE

FH issued HNF-MP-599, "Quality Assurance Program Description," which describes how FH implements the quality assurance (QA) requirements conveyed in U.S. Department of Energy Order 414.1A (*Quality Assurance*) and 10 CFR 830.121 ("Quality Assurance Program"). HNF-MP-599 also shows how the *Hanford Federal Facility Agreement and Consent Order* (Ecology et al. 1989) and *Hanford Analytical Services Quality Assurance Requirements Document* (DOE/RL-96-68) apply to Environmental QA Program Plans. Project management requirements are also detailed in HNF-RD-14988, "Project Management Requirements."

All work performed under this DOW will be in compliance with Project Hanford Management System QA program design (HNF-MP-599). A project specific QA Program plan for the Groundwater Remediation Project scope is presented in *Groundwater Remediation Project Quality Assurance Project Plan (GRP-QA-001)* (HNF-20635), or subsequent and equivalent FH quality program plans.

All operations including drilling, sampling and well completion/decommissioning, testing and associated documentation are subject to surveillance by FH, FH's authorizing agent and/or owner. This surveillance shall in no way relieve the contractor of any contractual responsibilities. Note the term "surveillance" as used here may include inspection, survey, and/or assessment. The drilling contractor will implement a QA program as submitted and approved under the drilling master agreement.

Technical procedures and specifications applicable to field activities performed under this DOW are listed in Section 7.2.

This page intentionally left blank.

6.0 SCHEDULE

Drilling operations for the new monitoring well is scheduled to begin after August 15, 2005. The well shall be completed no later than November 30, 2005.

This page intentionally left blank.

7.0 GENERAL REQUIREMENTS

Field work for the well will be conducted in accordance with FH procedures and FH blue-sheeted Environmental Restoration Contractor procedures and protocols and the specifications in this DOW. The applicable procedures are discussed in the following sections.

7.1 SAFETY AND HEALTH

All personnel working at the drilling sites addressed by this plan will have completed, at a minimum:

- *Occupational Safety and Health Administration Act* 40-hour Hazardous Waste Site Worker training program (29 CFR 1910.120).
- Hanford General Employee Training is required for access to the 100 and 200 Areas.
- Radiation Worker II.

Work will be performed in accordance with the following procedures:

- *Project Hanford Management Contract Radiological Control Manual* (HNF-5173)
- Site specific plans, as applicable:
  - Health and safety plans
  - Radiological evaluation/radiation work permits
  - Activity hazard analysis/job safety analysis
  - FH Site Specific Waste Management Instructions
- Central Plateau Radiological Control Procedures

7.2 TECHNICAL PROCEDURES/SPECIFICATIONS

This section identifies technical procedures/specifications applicable to field activities performed under this DOW. Activities associated with the drilling and installation of this well and management of waste generated by these activities will adhere to, at a minimum, the following FH procedures and requirements:

- HNF-PRO-10863, "Notebooks and Logbooks"
- GPR-EE-01-1.11, "Purgewater Management"

- GRP-EE-05-1.17, "Determination of Hexavalent Chromium in Water, Wastewater, and Soils Utilizing the Hach DR/2000 and DR/2010 Spectrophotometers"
- GPR-EE-01-3.0, "Chain of Custody"
- GPR-EE-01-3.1, "Sample Packaging and Shipping"
- GPR-EE-01-4.0, "Soil and Sediment Sampling"
- GRP-EE-01-4.1 "Groundwater Sampling"
- GPR-EE-01-6.2, "Field Cleaning and/or Decontamination of Geoprobe and Drilling Equipment"
- GRP-EE-01-6.3 "Well Development and Testing"
- GPR-EE-01-7.0, "Geologic Logging"
- GPR-EE-02-14.1, "Drilling, Remediating, and Decommissioning Resource Protection Wells and Geotechnical Soil Borings"
- FH waste management procedures HNF-PRO-15333, HNF-PRO-15334, HNF-PRO-15335, and HNF-EP-0063 as required.
- WAC 173-160, "Minimum Standards for Construction and Maintenance of Wells."

8.0 PROJECT DOCUMENTATION

Documentation requirements for these activities are separated into scoping documents, field activity documents, and reporting documents. The following documents will be prepared to support the well drilling activity:

- Scoping documents
  - This document
  - DQO summary report
  - Sampling and analysis plan
  - Drilling specifications/subcontractor scope of work (procurement package)
  - Sample authorization form
  - Excavation permit
  - Additional waste management documents, as required.
- Field documentation
  - Well Drilling/Decommissioning Planning Form
  - Daily field activity reports
  - Sample collection, custody, and shipment documentation for waste samples
  - Well logs (borehole lithologic and completion)
  - Field logbook
  - Well construction summary report
  - Well summary sheet
  - Field cleaning and/or decontamination sheets
  - Well development and testing data sheets
  - Sieve analysis sheets
  - Well Survey Data Report
  - Well Acceptance Report.
- Reporting documents
  - Field documentation will be transmitted to FH Groundwater Protection Program Support for incorporation into the well database.
  - Borehole summary report.

The records produced for this project will undergo technical and management review in accordance with FH practices and procedures. The required reviewers will be identified prior to document completion, and the review time will be established as soon as practical.

This page intentionally left blank.

9.0 REFERENCES

Groundwater Protection Program Procedures:

GPR-EE-01-3.0, "Chain of Custody"

GPR-EE-01-3.1, "Sample Packaging and Shipping"

GPR-EE-01-4.0, "Soil and Sediment Sampling"

GPR-EE-01-6.2, "Field Cleaning and/or Decontamination of GeoProbe® and Drilling Equipment"

GPR-EE-01-6.3 "Well Development and Testing"

GPR-EE-01-7.0, "Geologic Logging"

GPR-EE-02-14.1, "Drilling, Remediating, and Decommissioning Resource Protection Wells, and Geotechnical Soil Borings"

GPR-EE-05-1.17, "Determination of Hexavalent Chromium in Water, Wastewater, and Soils Utilizing the Hach DR/2000 and DR/2010 Spectrophotometers"

10 CFR 830.121, "Quality Assurance Program," *Code of Federal Regulations,* as amended.

29 CFR 1910.120, "Hazardous Waste Operations and Emergency Response," *Code of Federal Regulations*, as amended.

40 CFR 265, "Interim Status Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities," *Code of Federal Regulations,* as amended.

ANSI, 1967, *Safety Color Codes,* ANSI Z53.1-1967, American National Standards Institute, New York, New York.

BHI-01518, 2001, *Description of Work for Calendar Year 2001 RCRA Drilling*, Rev. 0, Bechtel Hanford, Inc., Richland, Washington

Comprehensive Environmental Response, Compensation and Liability Act of 1980, 42 USC 9601, et seq.

CP-15329, 2003, *Data Quality Objectives Summary Report for Establishing a RCRA/CERCLA/AEA Integrated 200 West and 200 East Groundwater Monitoring Network,* Rev. 0, Fluor Hanford, Inc., Richland, Washington.

DOE Order 414.1A, 1999, *Quality Assurance*, U.S. Department of Energy, Office of Environment, Safety, and Health, Washington, D.C.

DOE/RL-96-68, 1996, *Hanford Analytical Services Quality Assurance Requirements Document (HASQARD)*, Rev. 0, U.S. Department of Energy, Richland Operations Office, Richland, Washington.

DOE/RL 2005-72, 2005, *Sampling and Analysis Plan for Two New Deep Well in the 200-ZP-1 Operable Unit at Single Shell Tanks, Waste Management Areas T, Calendar Year 2005*, Rev. 0, U.S. Department of Energy, Richland Operations Office, Richland, Washington.

Ecology, EPA, and DOE, 1989, *Hanford Federal Facility Agreement and Consent Order* (Tri-Party Agreement), 2 vols., as amended, Washington State Department of Ecology, U.S. Environmental Protection Agency, and U.S. Department of Energy, Olympia, Washington.

HNF-20635, 2004, *Groundwater Remediation Project Quality Assurance Project Plan (GPR-QA-001)*, Rev. 0, Fluor Hanford, Inc., Richland, Washington.

HNF-5173, 2002, *Project Hanford Management System Radiological Control Manual*, Rev. 2, Fluor Hanford, Inc., Richland, Washington.

HNF-EP-0063, 2005, "Hanford Site Solid Waste Acceptance Criteria," Rev. 12, Fluor Hanford, Inc., Richland, Washington.

HNF-MP-599, 2004, "Quality Assurance Program Description," Rev. 14, Fluor Hanford, Inc., Richland, Washington.

HNF-PRO-10863, 2002, "Notebooks and Logbooks," Rev. 0, Fluor Hanford, Inc., Richland, Washington.

HNF-PRO-15333, 2004, "Environmental Protection Processes," Rev. 3, Fluor Hanford, Inc., Richland, Washington.

HNF-PRO-15334, 2005, "Effluent and Environmental Monitoring," Rev. 2, Fluor Hanford, Inc., Richland, Washington.

HNF-PRO-15335, 2004, "Environmental Permitting and Documentation Preparation," Rev. 1, Fluor Hanford, Inc., Richland, Washington.

HNF-RD-14988, 2005, "Project Management Requirements," Rev. 2, Fluor Hanford, Inc., Richland, Washington.

Izatt, R. D., 1990, *Strategy* for *Handling and Disposing of Purgewater at the Hanford Site, Washington*, letter 90-ERB-040, to P. T. Day, U.S. Environmental Protection Agency, and T. L. Nord, Washington State Department of Ecology, dated July 19, 1990, U.S. Department of Energy, Richland Operations Office, Richland, Washington.

PNNL-12261, 2000, *Revised Hydrogeology for the Suprabasalt Aquifer System, 200-East Area and Vicinity, Hanford Site, Washington*, Pacific Northwest National Laboratory, Richland, Washington.

PNNL-13590, 2001. *Borehole Data Package for Calendar Year 2000-2001 RCRA Wells at Single-Shell Tank Waste Management Area T*, Pacific Northwest National Laboratory, Richland, Washington.

PNNL-13830, 2001, *Borehole Data Package for Calendar Year 2001 RCRA Well Installation at Single-Shell Tank Waste Management Area T*, Pacific Northwest National Laboratory, Richland, Washington.

PNNL-13858, 2002, *Revised Hydrogeology for the Suprabasalt Aquifer System, 200-West Area and Vicinity, Hanford Site, Washington*, Pacific Northwest National Laboratory, Richland, Washington.

RCW 70.105, "Hazardous Waste Management," *Revised Code of Washington*, as amended.

Resource Conservation and Recovery Act of 1976, 42 U.S.C. 6901, et seq.

WAC 173-160, "Minimum Standards for Construction and Maintenance of Wells," *Washington Administrative Code*, as amended.

WAC 173-303, "Dangerous Waste Regulations," *Washington Administrative Code*, as amended.

WAC 173-340, "Model Toxics Control Act – Cleanup," *Washington Administrative Code*, as amended.

This page intentionally left blank.

DISTRIBUTION

Onsite

3	U.S. Department of Energy Richland Operations Office	
	DOE Public Reading Room	H2-53
	A. C. Tortoso (2)	A6-38
10	Fluor Hanford, Inc.	
	J. V. Borghese	E6-35
	G. D. Cummins	E6-35
	B. H. Ford	E6-35
	J. D. Isaacs	E6-35
	S. W. Petersen	E6-35
	V. J. Rohay	E6-35
	L. C. Swanson	E6-35
	M. R. Stott (3)	E6-35
	J. A. Winterhalder	E6-35
	C. S. Wright	E6-35
4	Lockheed Martin Services, Inc.	
	Central Files	B1-07
	Document Processing Center (1)	H6-08
	EDMC (2)	H6-08
1	Pacific Northwest National Laboratory	
	Hanford Technical Library	P8-55

This page intentionally left blank.